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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,564	07/06/2006	Douglas M. Matson	2002458-0013	4221
7590 07/10/2009 Patent Group Choate, Hall & Stewart LLP Two International Place Boston, MA 02110			EXAMINER KERNS, KEVIN P	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 07/10/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,564	MATSON ET AL.	
	Examiner	Art Unit	
	Kevin P. Kerns	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) 54-78 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/26/07, 5/13/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicants' election without traverse of Group I (claims 1-53) in the reply filed on May 11, 2009 is acknowledged.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In this instance, the abstract is not on a separate sheet (the abstract is only a minor portion of the front page of WO 2005/070091 A2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-22, 27-48, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szabo (US 3,850,733) in view of Ue et al. (US 5,587,871).

Regarding independent claims 1, 27, and 53, Szabo discloses a method of forming foundry molds by electrophoretic deposition of refractory particles to form a shell mold on a template in the form of a conductive coated wax pattern (abstract; column 1, lines 3-20 and 62-67; column 2, lines 1-24 and 37-67; and column 3, line 1 through column 7, line 48), in which the method includes the steps of immersing the template (coated wax pattern) in a slurry comprising a plurality of colloidal particles (e.g. silica, alumina etc.) in an electrophoretically mobile solution, applying a direct current and voltage to the template to cause the colloidal particles to be deposited on the template to form a green ceramic shell mold, and sintering the green ceramic shell mold to form a solidified ceramic shell mold having greater mechanical integrity than the green ceramic shell mold, and casting molten metal to form an article in the solidified

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ceramic shell mold (column 6, lines 60-61). Szabo does not disclose providing an effective quantity of salt to impart an effective charge to the colloidal particles.

However, Ue et al. disclose an electrolyte solution containing an organic polar solvent and an ionic solute (abstract; column 1, lines 9-16 and 65-67; column 2, line 1 through column 4, line 30; and Examples), in which the electrolyte solution includes an effective quantity of salt of a monovalent cation such as sodium ion of 5 wt% in the electrolyte for the purpose of imparting charge to colloidal particles such as aluminosilicate having controlled fine size between 3 and 150 nm suspended in the non-aqueous slurry including a solution of methanol and ethanol for the purpose of improving dielectric breakdown voltage (spark voltage) greater than 80 V at an applied current of 5 mA.

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of forming foundry molds by electrophoretic deposition of refractory particles to form a shell mold on a template, as disclosed by Szabo, by using the electrolyte solution that includes an effective quantity of salt and controlled fine size of colloidal particles, as taught by Ue et al., in order to effectively form foundry molds by electrophoretic deposition by improving dielectric breakdown voltage (Ue et al.; column 1, lines 9-16 and 65-67; and column 2, lines 1-2).

Regarding claims 2-4 and 28-30, Szabo discloses that the template is a conductive material that further comprises a conductive coating deposited by a sputtering deposition or electroplating process.

Regarding claims 5-7 and 31-33, Szabo discloses that the slurry is non-aqueous and would have a dielectric breakdown voltage greater than 50VDC by including isopropanol or alcohol-hydrocarbon mixtures (column 5, lines 19-23).

Regarding claims 8-14 and 34-40, Szabo discloses that the colloidal particles include silica and alumina having particle sizes within the micron and nanometer ranges (column 4, lines 19-22).

Regarding claims 15-20 and 41-46, Ue et al. disclose that the salt is a metal salt, preferably sodium halide in a concentration of 5 wt% in the electrolyte, which is below its solubility limit (column 3, lines 13-21; and Examples).

Regarding claims 21, 22, 47, and 48, although not specifically disclosed by either Szabo or Ue et al., the applied voltage would be adjustable to approximately 100 volts to produce a current of 3-5 mA, as one of ordinary skill in the art would have optimized to obtain desired results via routine experimentation.

6. Claims 23-26 and 49-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Szabo (US 3,850,733) in view of Ue et al. (US 5,587,871), as applied to claims 1 and 27 above, and further in view of Gal-Or et al. (US 5,919,347).

Szabo (in view of Ue et al.) disclose and/or suggest the features of independent claims 1 and 27. Neither Szabo nor Ue et al. specifically discloses the steps of providing a low porosity and multilayered deposition for the shell.

However, Gal-Or et al. disclose a multilayered deposition of low porosity for the shell for the purpose of producing a green shell having porosity of less than 30% (and

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less than 2% for the fired body) and depositing each microlayer in a different suspension, thus obtaining precisely controlled shape and high strength while being cost effective and environmentally-friendly (abstract; column 1, lines 50-67; column 2, lines 1-44 and 64-67; column 3, lines 1-22; and Examples 1 and 2).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the method of forming foundry molds by electrophoretic deposition of refractory particles to form a shell mold on a template, as disclosed by Szabo, by using the electrolyte solution that includes an effective quantity of salt and controlled fine size of colloidal particles, as taught by Ue et al., in order to effectively form foundry molds by electrophoretic deposition by improving dielectric breakdown voltage, and by further providing a low porosity and multilayered deposition for the shell, as disclosed by Gal-Or et al., in order to produce a green shell having porosity of less than 30% (and less than 2% for the fired body) and depositing each microlayer in a different suspension, thus obtaining precisely controlled shape and high strength while being cost effective and environmentally-friendly (Gal-Or et al.; column 3, lines 10-22).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns
Primary Examiner
Art Unit 1793

/Kevin P. Kerns/
Primary Examiner, Art Unit 1793
July 6, 2009